



EMC TEST REPORT

Report No.: SET2013-06656

Product Name: IP Phone

FCC ID: YZZGXP2140

Model No. : GXP2140

Applicant: Grandstream Networks, INC

Address: 5F, Bldg #1, No.2 Kefa Rd., Science & Technology Park,
Shenzhen, China

Received Date: 2013-10-18

Tested Date: 2013-10-18—2013-10-29

Issued by: CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Lab Location: Electronic Testing Building, Shahe Road, Xili, Nanshan District,
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Test Report

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Shenzhen, China

Manufacturer..... :
Grandstream Networks, INC

Manufacturer Address : 5F, Bldg #1, No.2 Kefa Rd., Science & Technology Park,
Shenzhen, China

Test Standards..... : 47 CFR Part 15 Subpart B: Radio Frequency Devices

Test Result : PASS

Tested by : 
_____ 2013.11.22
Xiaolong Zhang, Test Engineer

Reviewed by..... : 
_____ 2013.11.22
Shuangwen Zhang, Senior Engineer

Approved by : 
_____ 2013.11.22
Wu Li'an, Manager



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Change History		
Issue	Date	Reason for change
1.0	Nov 22,2013	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type : GXP2140
Serial No..... : (n.a, marked #1 by test site)
FCC ID : YZZGXP2140
Hardware Version..... : /
Software Version : /
Ancillary Equipment 1 : AC Adapter (Charger for Battery)
Brand Name: MASSPOWER
Model Name: WEF1200100A1BA, WEF1200100E1BA,
WEF1200100I1BA
Serial No.: (n.a. marked #1 by test site)
Rated Input: 100-240V, 60/50Hz, 0.3A
Ancillary Equipment 2..... : Rated Output: 12V=1.0A
PC
Brand Name: ThinkPad
Model Name: E420
Serial No.: 1141AH6

Note 1: The EUT is a IP Phone, it supports Bluetooth2.1+EDR.

Note 2: The EUT has two different mainboards , both of which have been tested, only the worse results are reported in this report.

Note 3: The EUT is equipped with a PC port which can be connected to the ancillary equipments supplied by the manufacturer e.g. the network Cable.

Note 4: For a more detailed description, please refer to Specification or User’s Manual supplied by the applicant and/or manufacturer.



1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B 2012	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	PASS
2	15.109	Radiated Emission	PASS

NOTE: The EUT has been tested according to 47 CFR Part 15 Subpart B, Class B. The test procedure is according to ANSI C63.4:2009 and CISPR 22:2008. The test results are as following:



1.3 Facilities and Accreditations

1.3.1 Facilities

CNAS-Lab Code: L1659

CCIC-SET Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8*6.8*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

FCC-Registration No.: 406086

CCIC-SET Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, Renewal date Nov. 19, 2011, valid time is until Nov. 18, 2014.

1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15°C - 35°C
Relative Humidity (%):	30% - 60%
Atmospheric Pressure (kPa):	86KPa-106KPa

1.3.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission:	Uc = 3.6 dB (k=2)
Uncertainty of Radiated Emission:	Uc = 4.5 dB (k=2)



2. TEST CONDITIONS SETTING

2.1 Test Mode

1.The EUT of first mainboard

- (1) The first test mode (USB)

The EUT configuration of the emission tests is EUT + PC+charge.

In this test mode, the EUT is connected with a PC via a network cable supplied by applicant and powered by charge. During the measurement, the data is transmitting between the PC and the EUT.

- (2) The first test mode

The EUT configuration of the emission tests is EUT + PC+POE.

In this test mode, the EUT is connected with a PC via a network cable supplied by applicant and powered by POE. During the measurement, the data is transmitting between the PC and the EUT.

2.The EUT of second mainboard

- (1) The first test mode (USB)

The EUT configuration of the emission tests is EUT + PC+charge.

In this test mode, the EUT is connected with a PC via a network cable supplied by applicant and powered by charge. During the measurement, the data is transmitting between the PC and the EUT.

- (2) The first test mode

The EUT configuration of the emission tests is EUT + PC+POE.

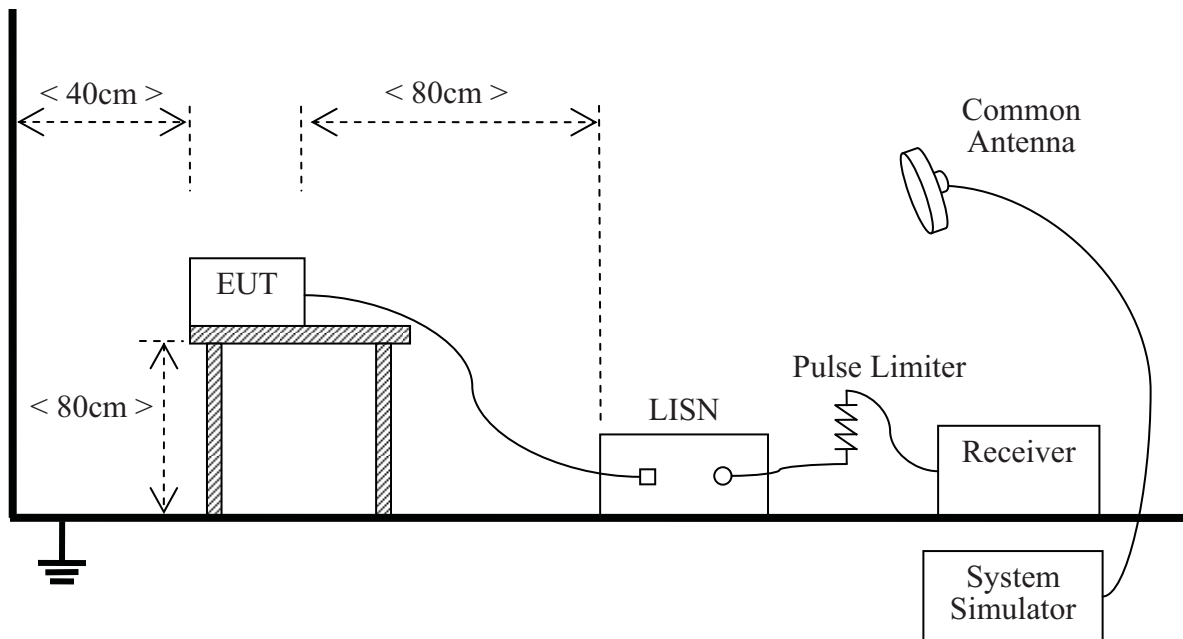
In this test mode, the EUT is connected with a PC via a network cable supplied by applicant and powered by POE. During the measurement, the data is transmitting between the PC and the EUT.

NOTE: All test modes are performed, only the worst cases are recorded in this report.

2.2 Test Setup and Equipments List

2.2.1 Conducted Emission

A. Test Setup:



The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides $50\Omega/50\mu\text{H}$ of coupling impedance for the measuring instrument. The Common Antenna is used for the call between the EUT and the System Simulator (SS). A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

B. Equipments List:

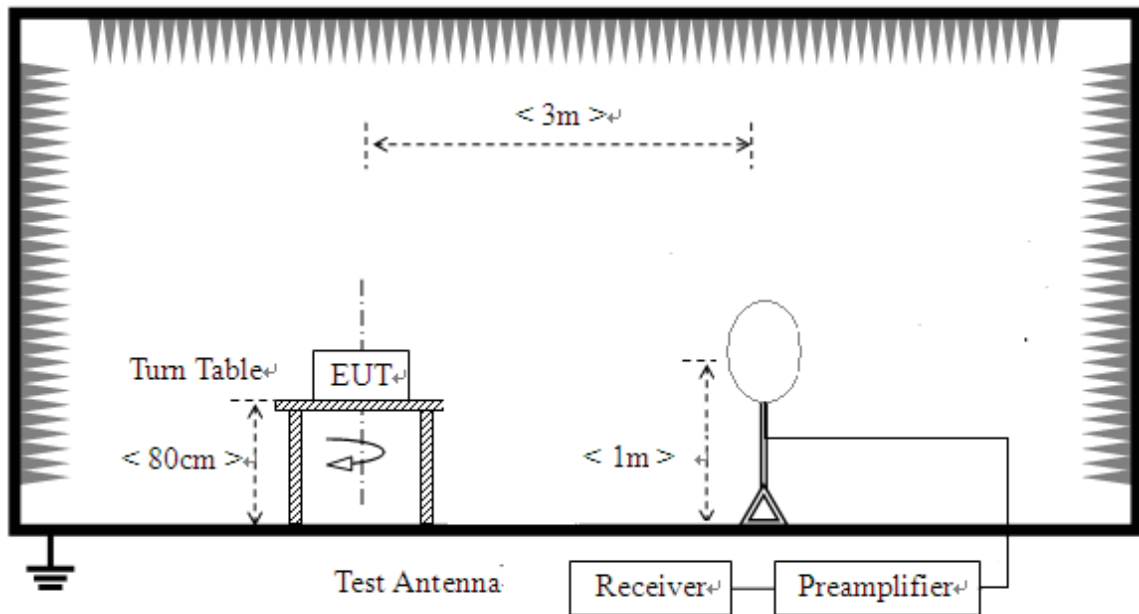
Description	Manufacturer	Model	Serial No.	Calibration Due. Date
Test Receiver	Schwarzbeck	FCKL1528	A0304230	2014.06.10
LISN	Schwarzbeck	NSLK8127	A0304233	2014.06.10
Personal Computer	ThinkPad	T430i	A130401289	(n.a.)
Keyboard	Lenovo	KU-0989	(n.a.)	(n.a.)
Mouse	Logitech	M-UV96	(n.a.)	(n.a.)

Note: PC ,Keyboard and Mouse all have FCC DOC approval.

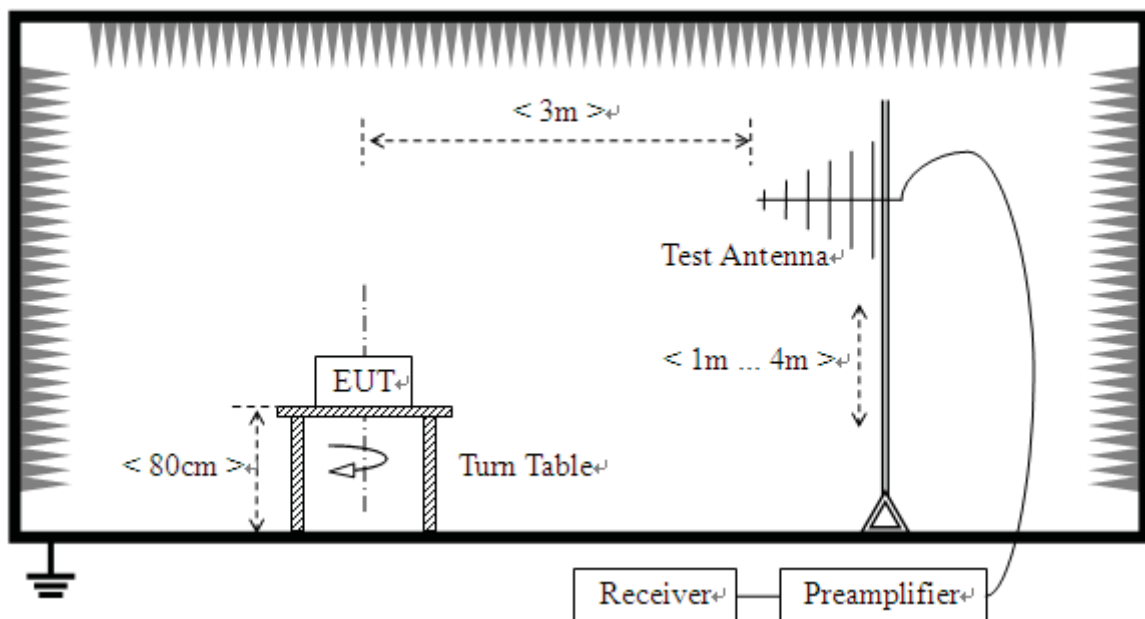
2.2.2 Radiated Emission

A. Test Setup:

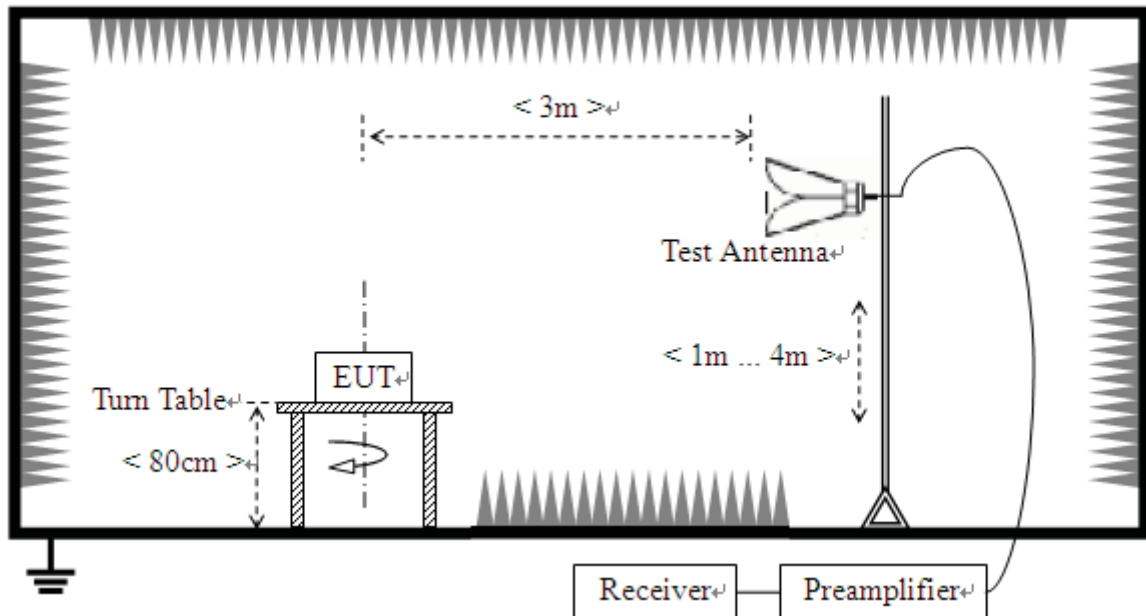
- 1) For radiated emissions from 9kHz to 30MHz



- 2) For radiated emissions from 30MHz to 1GHz



3) For radiated emissions above 1GHz


B. Test Procedure

The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower.

For the test Antenna:

- 1) In the frequency range of 9KHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- 2) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

C. Equipments List:



Description	Manufacturer	Model	Serial No.	Calibration Due. Date
Test Receiver	ROHDE&SCHWARZ	ESIB7	A0501375	2014.06.10
Test Receiver	ROHDE&SCHWARZ	ESIB26	A0304218	2014.06.10
Semi-Anechoic Chamber	Albatross Projects GmbH	9m*6m*6m	A0412372	2014.01.04
Test Antenna - Bi-Log	HP	CBL6111A	A9704202	2014.06.10
Test Antenna - Horn	ROHDE&SCHWARZ	HF906	A0304225	2014.06.10
Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4 m	A0304210	2014.03.09
Amplifier 1G~18GHz	ROHDE&SCHWARZ	MITEQ AFS42-0010 1800	25-S-42	2014.06.10
Amplifier 20M~3GHz	Compliance Direction System	PAP-0203H	22018	2014.06.10
Personal Computer	ThinkPad	T430i	A130401289	(n.a.)
Keyboard	Lenovo	KU-0989	(n.a.)	(n.a.)
Mouse	Logitech	M-UV96	(n.a.)	(n.a.)

Note: PC ,Keyboard and Mouse all have FCC DOC approval.



3. 47 CFR PART 15B REQUIREMENTS

3.1 Conducted Emission

3.1.1 Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50- 5	56	46
5 - 30	60	50

NOTE:

- The limit subjects to the Class B digital device.
- The lower limit shall apply at the band edges.
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.1.2 Test Description

See section 2.2.1 of this report.

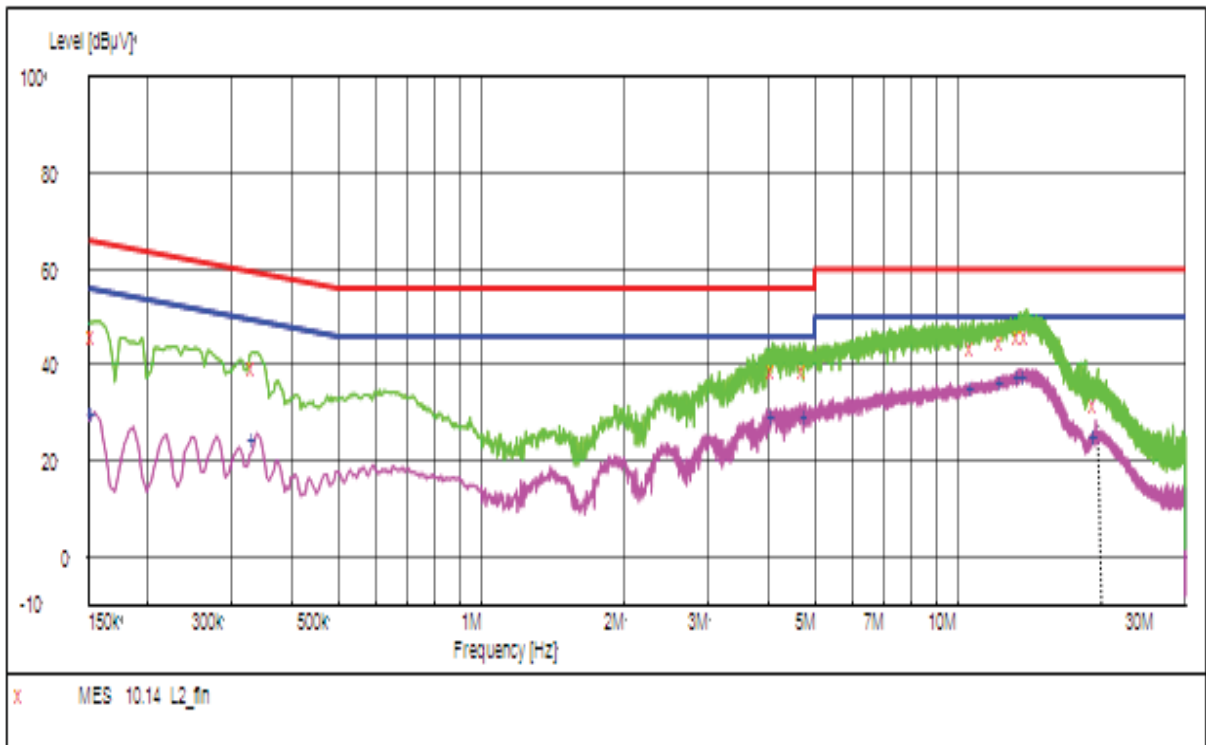
3.1.3 Test Result

The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

3.1.3.1 Test Mode

1.The EUT of first mainboard

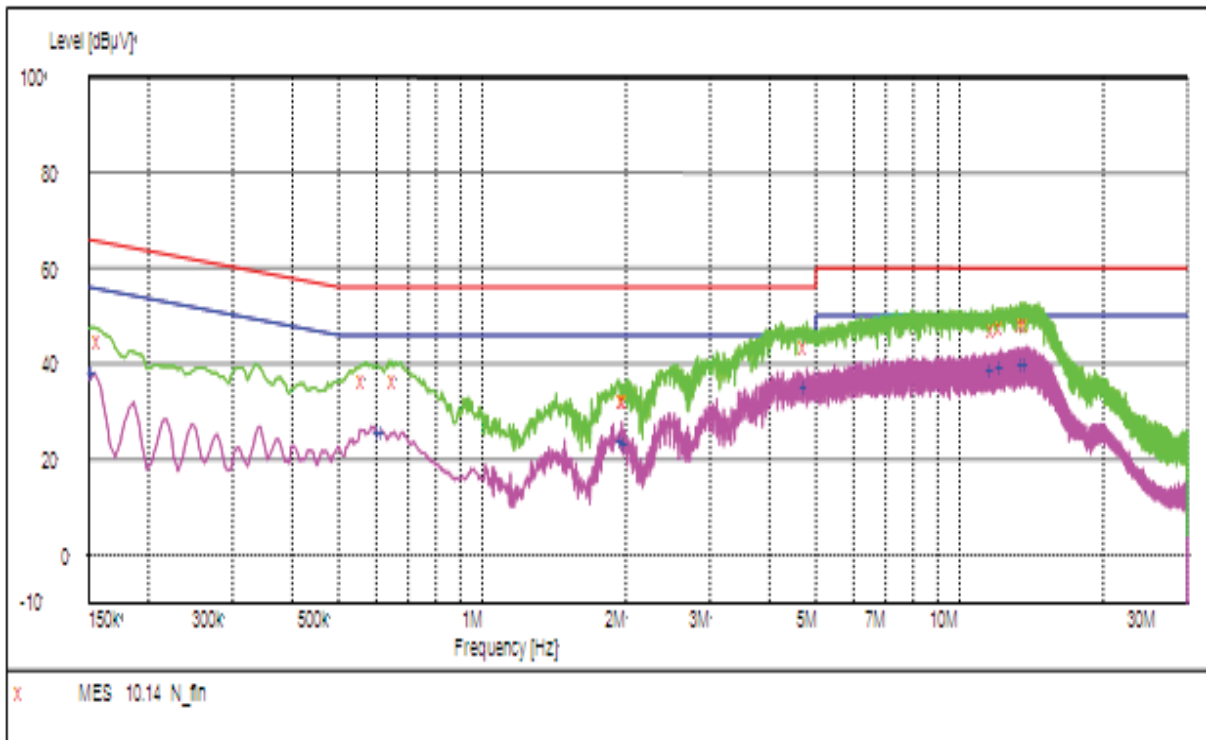
A. Test Plot and Suspicious Points:



Conducted Disturbance at Mains Terminals							
L Test Data							
QP				AV			
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)
0.1540	66	45.90	20.10	0.1540	56	29.80	26.20
4.7680	56	38.90	17.10	4.7680	46	29.10	16.90
13.9520	60	45.90	14.10	13.9520	50	37.80	12.20
L Test Curve							

(Plot A: L Phase)

B. Test Plot and Suspicious Points:

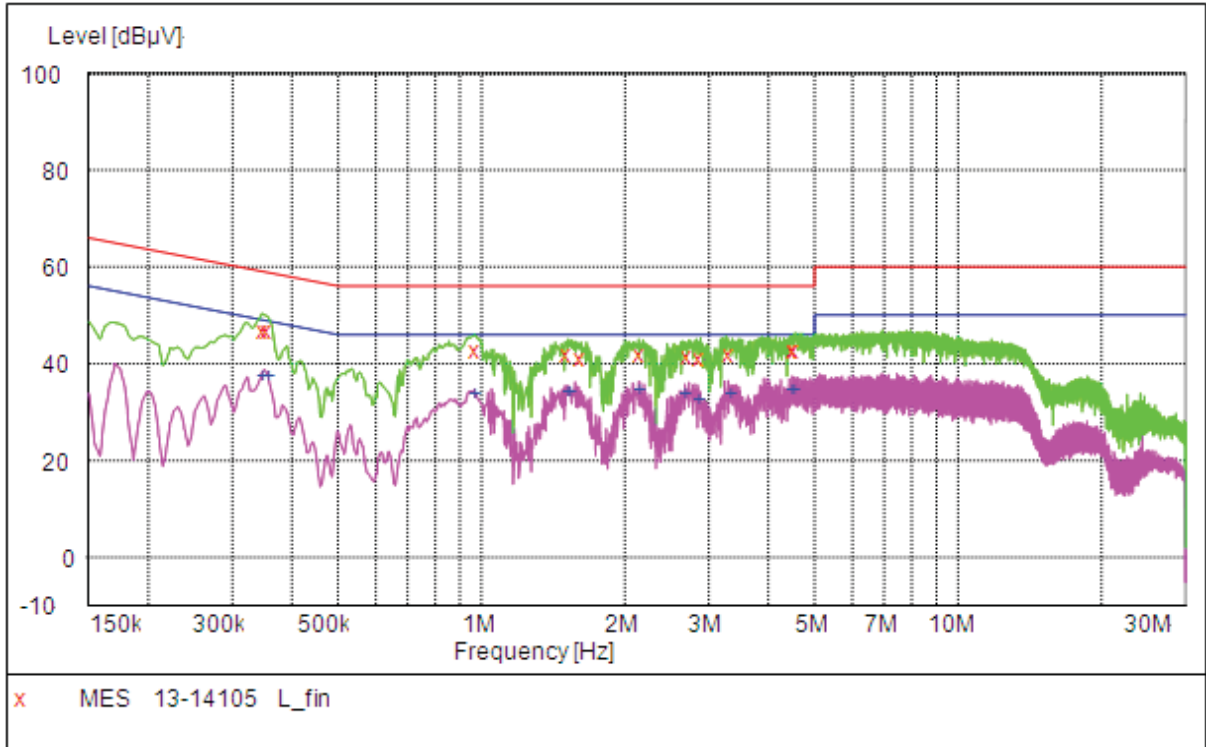


Conducted Disturbance at Mains Terminals							
N Test Data							
QP				AV			
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)
0.1580	66	44.70	21.30	0.1540	56	38.40	17.60
4.7600	56	43.70	12.30	4.7600	46	35.20	10.80
13.7800	60	48.50	11.50	13.7800	50	40.30	9.70
N Test Curve							

(Plot B: N Phase)

2.The EUT of second mainboard

C. Test Plot and Suspicious Points:

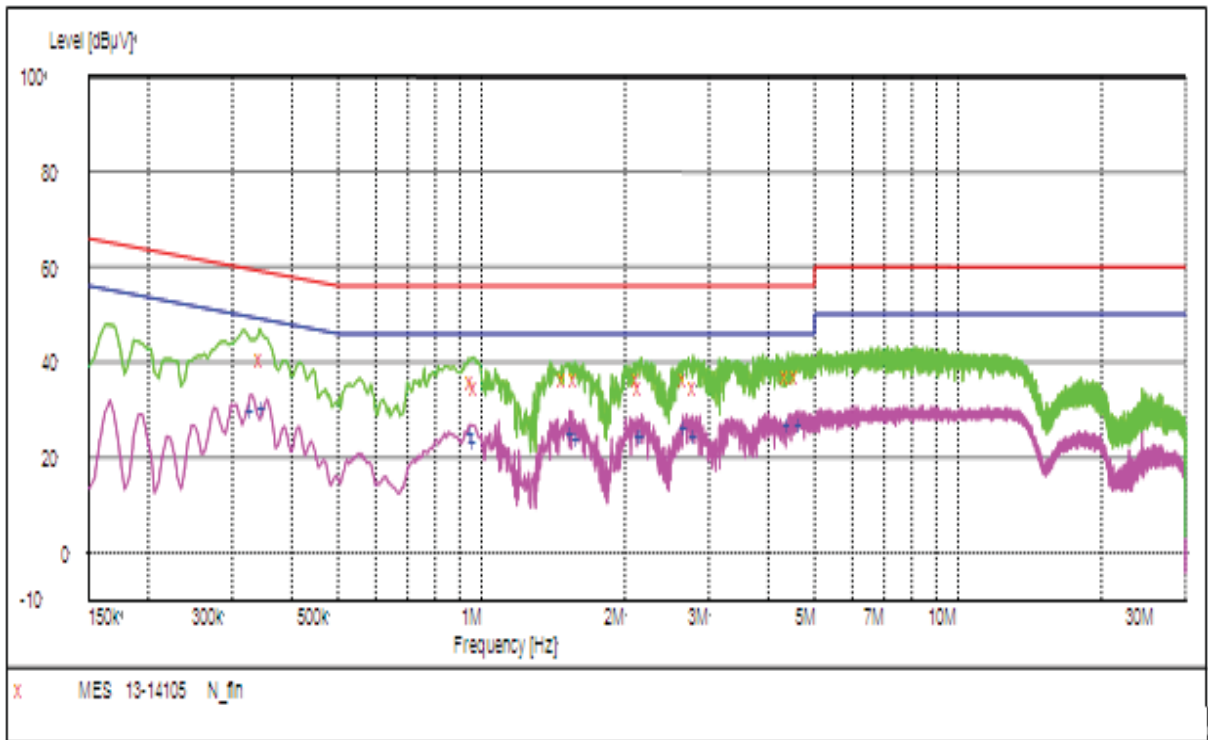


Conducted Disturbance at Mains Terminals							
L Test Data							
QP				AV			
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)
0.3500	59	47.30	11.70	0.3500	49	37.80	11.20
0.9680	56	43.20	12.80	0.9760	46	34.30	11.70
4.5040	56	43.00	13.00	2.1560	46	34.70	11.30
L Test Curve							

(Plot C: L Phase)



D. Test Plot and Suspicious Points:



Conducted Disturbance at Mains Terminals							
N Test Data							
QP				AV			
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)
0.3460	59.10	40.90	18.20	0.3500	49	30.40	18.60
1.4960	56	36.70	19.30	1.5660	46	25.50	21.50
4.5960	56	37.00	19.00	4.4160	46	26.90	19.10
N Test Curve							

(Plot D: N Phase)

Test Result: PASS

3.2 Radiated Emission

3.2.1 Requirement

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency range (MHz)	Field Strength		Field Strength Limitation at 3m Measurement Dist	
	$\mu\text{V/m}$	Dist	(uV/m)	(dBuV/m)
0.009 - 0.490	2400/F(KHz)	300m	10000* 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 - 1.705	2400/F(KHz)	30m	100* 2400/F(KHz)	20log 2400/F(KHz) + 40
1.705 - 30.00	30	30m	100*30	20log 30 + 40
30.0 - 88.0	100	3m	100	20log 100
88.0 - 216.0	150	3m	150	20log 150
216.0 - 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

- a) As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.
- b) Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.
- c) For below 1G :QP detector RBW 120KHz ,VBW 300KHz.
- d) For Above 1G: PK detector RBW 1MHz,VBW 3MHz for PK value ;PK detector RBW 1MHz, VBW 10Hz for AV value.

Note:

- 1) The tighter limit shall apply at the boundary between two frequency range.
- 2) Limitation expressed in dBuV/m is calculated by $20\log \text{Emission Level}(\text{uV/m})$.
- 3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^2$.

Example:

F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as

$$Ld1 = L1 = 30\text{uV/m} * (10)^2 = 100 * 30\text{uV/m}.$$

3.2.2 Test Description

See section 2.2.2 of this report.

3.2.3 Test Result

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

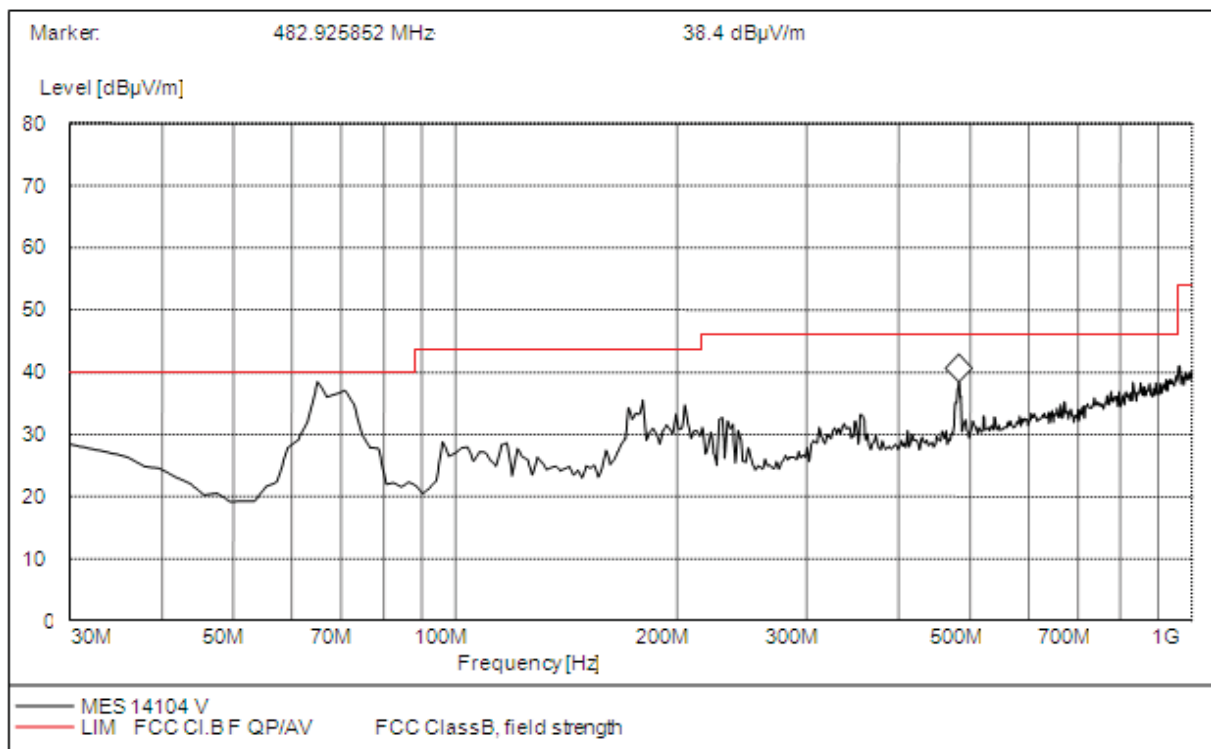
The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

A. Test Plots and Suspicious Points:

NOTE: The emissions are too small to be measured and are at least 6 dB below the limit, So all the data of marked are pass.

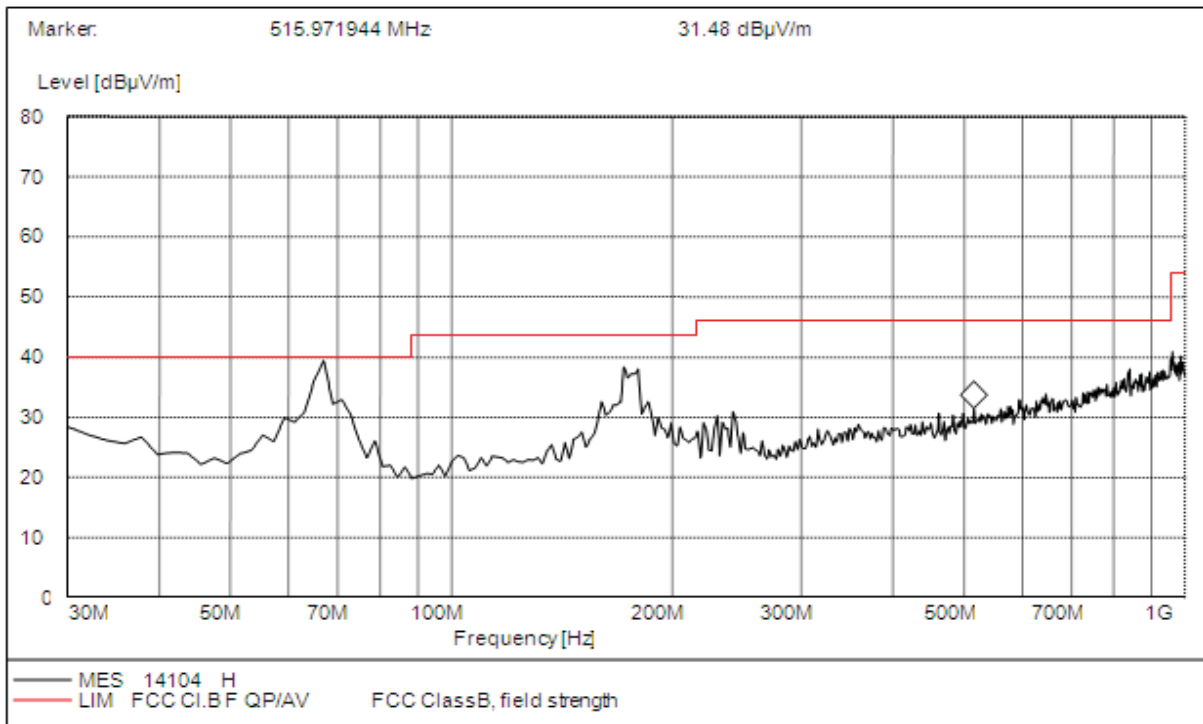
1.The EUT of first mainboard





(Plot A: Test Antenna Vertical 30M - 1G)

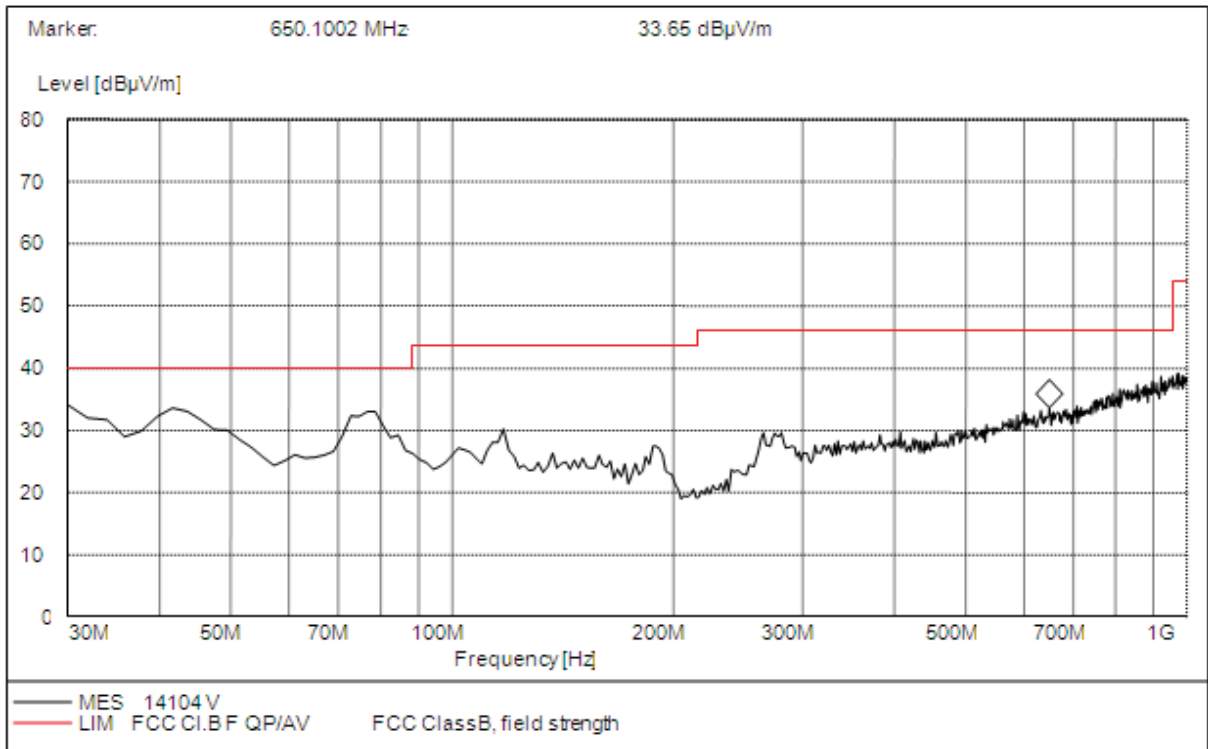
Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Verdict
64.989900	38.47	120.000	100.0	40.00	0.53	Vertical	Pass
179.679000	35.54	120.000	100.0	43.50	7.96	Vertical	Pass
482.925000	38.40	120.000	100.0	46.00	7.60	Vertical	Pass



(Plot B: Test Antenna Horizontal 30M - 1G)

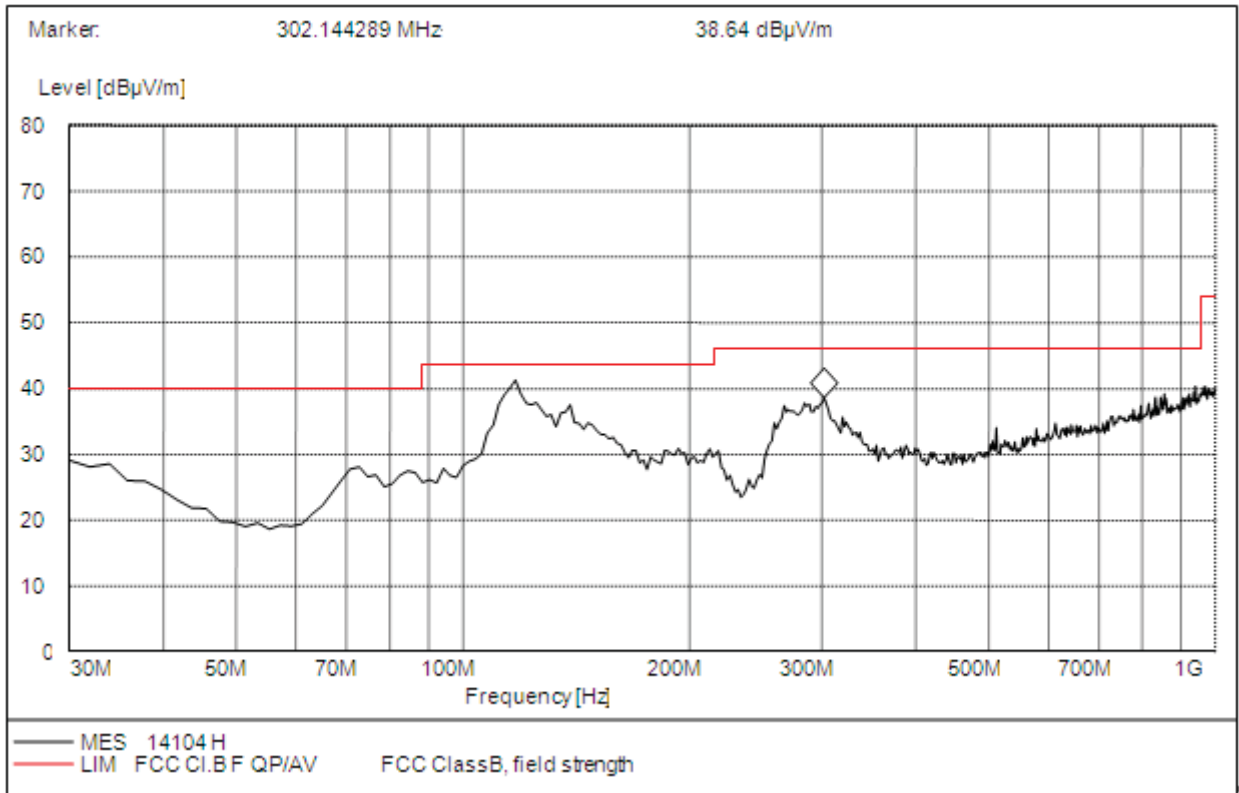
Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Verdict
66.933000	39.43	120.000	100.0	40.00	0.57	Horizontal	Pass
171.903000	38.38	120.000	100.0	43.50	5.12	Horizontal	Pass
515.971000	31.48	120.000	100.0	46.00	14.52	Horizontal	Pass

2.The EUT of second mainboard



(Plot A: Test Antenna Vertical 30M - 1G)

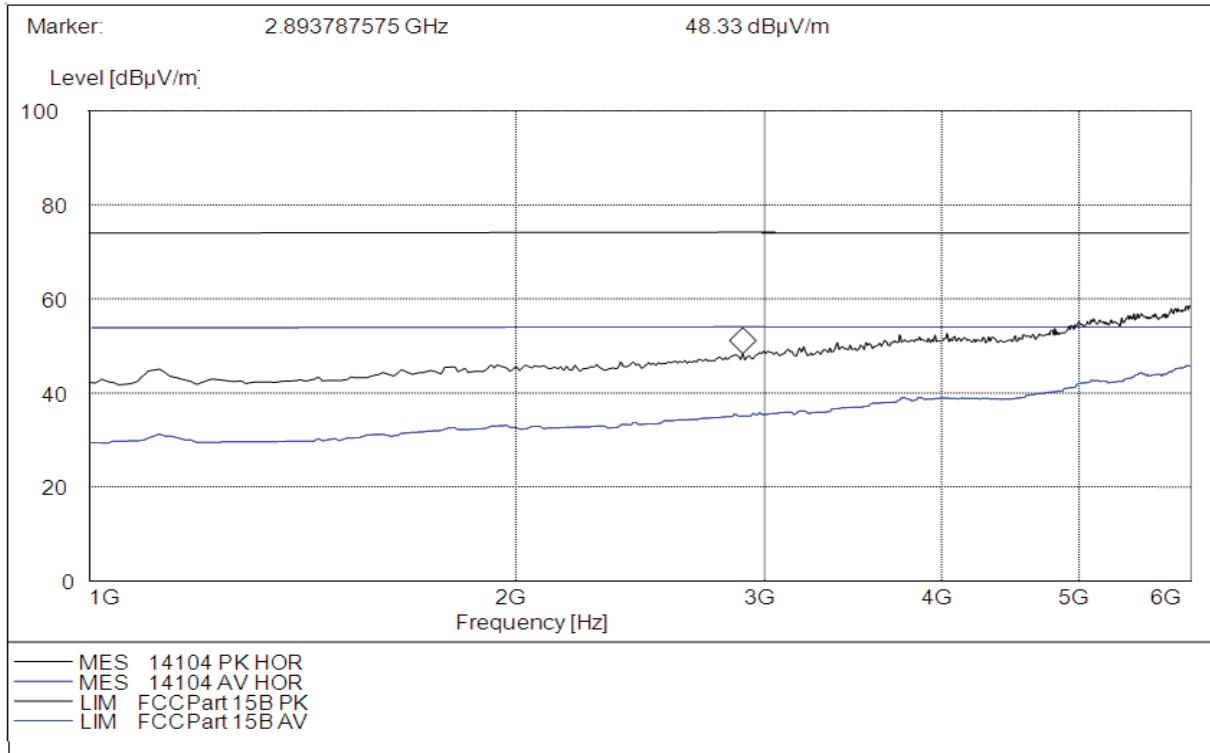
Frequency (MHz)	QuasiPeak (dB µ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB µ V/m)	Margin (dB)	Antenna	Verdict
41.660000	33.63	120.000	100.0	40.00	6.37	Vertical	Pass
117.470000	30.23	120.000	100.0	43.50	13.27	Vertical	Pass
650.100000	33.65	120.000	100.0	46.00	12.35	Vertical	Pass



(Plot B: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Verdict
33.887000	28.58	120.000	100.0	40.00	11.42	Horizontal	Pass
117.474000	41.28	120.000	100.0	43.50	2.22	Horizontal	Pass
302.140000	38.64	120.000	100.0	46.00	17.36	Horizontal	Pass

1.The EUT of first mainboard

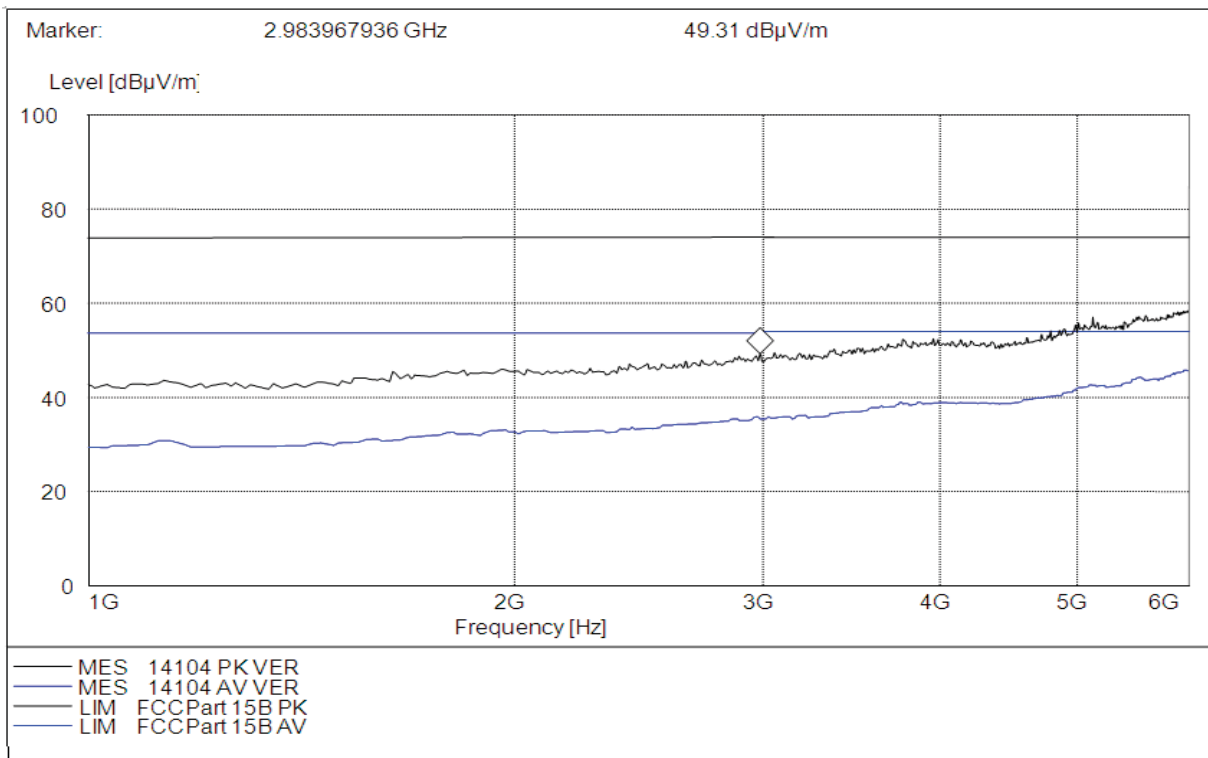


(Plot C: Test Antenna Horizontal 1G – 6G)

Frequency (MHz)	AV (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Verdict
1181.18036	30.83	1000.000	100.0	54.00	23.17	Horizontal	Pass
1593.51000	30.67	1000.000	150.0	54.00	23.33	Horizontal	Pass
1865.64000	33.57	1000.000	150.0	54.00	20.43	Horizontal	Pass
2412.22440	34.45	1000.000	100.0	54.00	19.55	Horizontal	Pass
5047.52546	41.33	1000.000	150.0	54.00	12.67	Horizontal	Pass
5975.93789	43.63	1000.000	100.0	54.00	10.37	Horizontal	Pass



Frequency (MHz)	PK (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Verdict
1181.18036	43.56	1000.000	100.0	74.00	30.44	Horizontal	Pass
1593.51000	40.67	1000.000	150.0	74.00	33.33	Horizontal	Pass
1865.64000	44.57	1000.000	150.0	74.00	29.43	Horizontal	Pass
2412.22440	45.48	1000.000	100.0	74.00	28.52	Horizontal	Pass
5047.52546	54.34	1000.000	150.0	74.00	29.66	Horizontal	Pass
5975.93789	58.53	1000.000	100.0	74.00	15.47	Horizontal	Pass



(Plot D: Test Antenna Vertical 1G – 6G)



Frequency (MHz)	AV (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Verdict
1061.90000	30.43	1000.000	150.0	54.00	23.57	Vertical	Pass
1780.00000	33.46	1000.000	150.0	54.00	20.54	Vertical	Pass
2412.21000	34.36	1000.000	150.0	54.00	19.64	Vertical	Pass
2983.96973	36.22	1000.000	148.0	54.00	17.78	Vertical	Pass
3395.00000	37.63	1000.000	150.0	54.00	16.37	Vertical	Pass
5921.82453	43.50	1000.000	100.0	54.00	10.50	Vertical	Pass

Frequency (MHz)	PK (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Verdict
1061.90000	41.23	1000.000	150.0	74.00	32.77	Vertical	Pass
1780.00000	43.46	1000.000	150.0	74.00	30.54	Vertical	Pass
2412.21000	47.36	1000.000	150.0	74.00	26.64	Vertical	Pass
2983.96973	49.31	1000.000	148.0	74.00	24.69	Vertical	Pass
3395.00000	50.63	1000.000	150.0	74.00	23.37	Vertical	Pass
5921.82453	57.90	1000.000	100.0	74.00	16.10	Vertical	Pass

Test Result: PASS

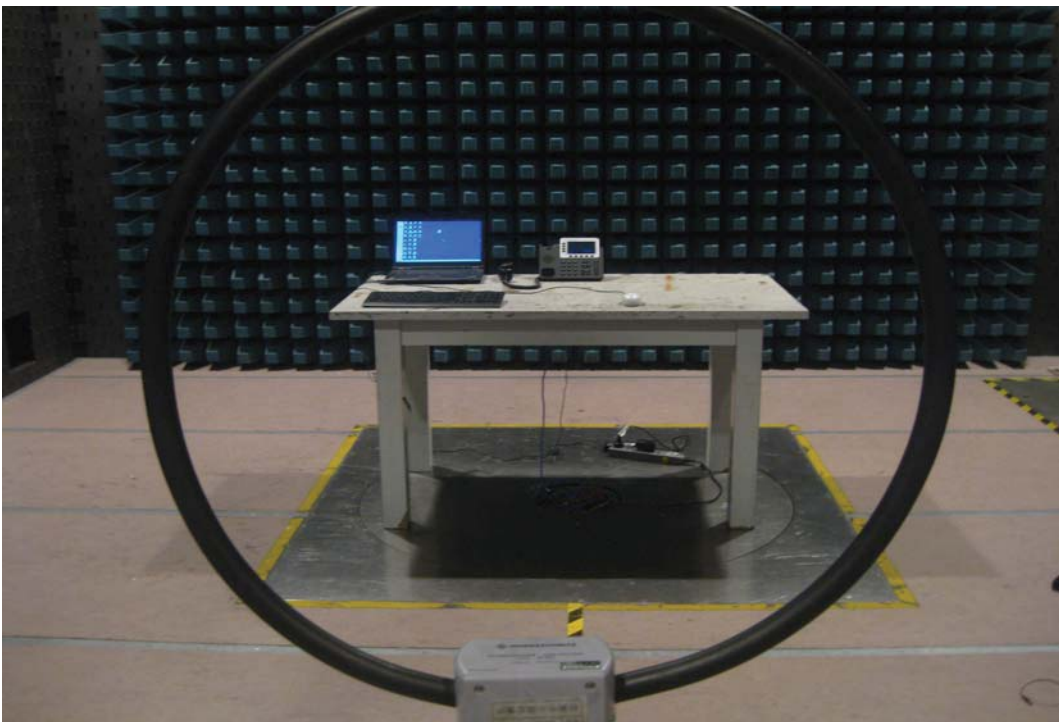
4. PHOTOGRAPHS OF THE EUT



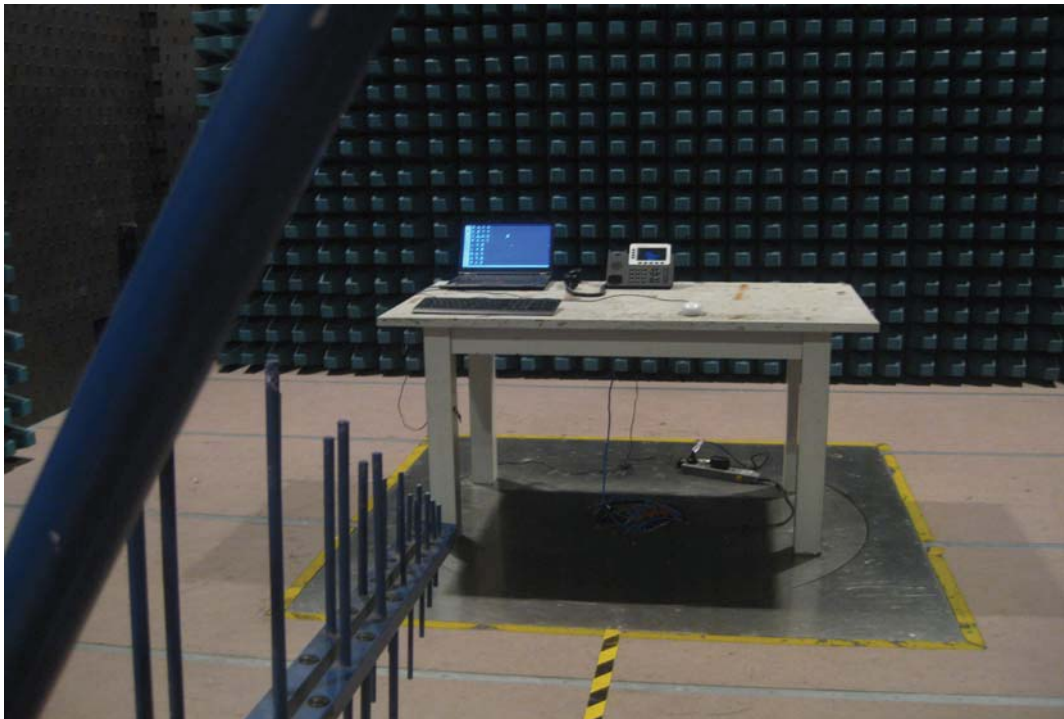
5. PHOTOGRAPHS OF THE TEST SET-UP



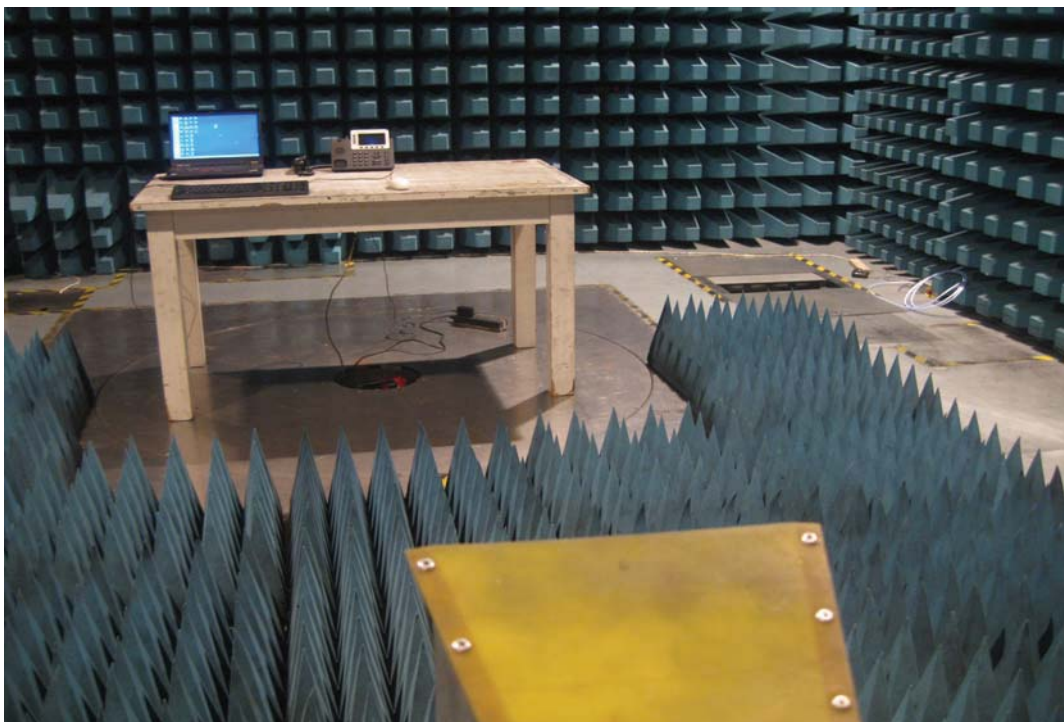
Conducted Emission



Radiated Emission of 9k-30M



Radiated Emission of 30M-1G



Radiated Emission of 1-18G

** END OF REPORT **